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ABSTRACT

These instructional objectives, written by Harvey Reynolds, have been selected from materials used at Golden West College (California). These objectives are offered simply as samples that may be used where they correspond to the skills, abilities, and attitudes instructors want their students to acquire. These objectives may also serve as models for assisting instructors to translate their courses into specific measurable terms. For other objectives in related courses see: ED 033 683 (College Algebra); and ED 049 751 (Intermediate Algebra). (MB)

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Instructional Objectives for a Junior College Course in Intermediate Algebra

Mathematics 110
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UNIVERSITY OF CALIF.
LOS ANGELES

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CLEARINGHOUSE FOR
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INFORMATION

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1972

MATH 110
COURSE OBJECTIVES
UNIT I

1. Be able to detect correct and incorrect usage of the following set symbols.

   $\{\ \}$, $\emptyset$, $\in$, $\notin$, $\subset$, $\subseteq$, $\not\subset$, $\{x|\quad\}$, $\cap$, $\cup$

2. Given 2 sets A and B determine which of the following relationships hold.

   $A = B$, $A \subset B$, $A \subseteq B$, $B \subset A$, $B \subseteq A$, $A \in B$, $B \in A$

   $\emptyset \in A$, $\emptyset \subset A$

3. Given a set be able to specify the set using either the roster method or the set builder notation.

4. State the proper inclusion relationships between N, I, F, R and the irrationals.

5. Given a number determine if the number is a member of N, I, F, R or the irrationals.

6. Given sets A, B, determine:

   $A \cap B$, $A \cup B$

7. Determine if a set is finite or infinite.

8. Determine if a number is a prime, even or odd.

9. Determine the decimal equivalent of a fraction and identify as a terminating, non-terminating or repeating decimal.

MATH 110
SELF-TEST
UNIT 1

FILL EACH BLANK SPACE WITH EITHER $\subset$, $\subseteq$, $\in$ TO FORM A TRUE STATEMENT.

1. 5 ____ $\{4, 5, 6\}$ OBJ. 1, 2

2. $\{4, 5, 6\}$ ____ $\{4, 5, 6\}$

3. $\{5\}$ ____ $\{4, 5, 6\}$

4. $\emptyset$ ____ $\{4, 5, 6\}$

5. $\emptyset$ ____ $\{0\}$

USE THE SUBSET SYMBOL $\subseteq$ TO EXPRESS THE RELATIONSHIP BETWEEN THE SPECIFIED SETS.

6. The set of natural numbers N, and the set of real numbers R. OBJ. 4

7. The set of rational numbers F, and the set of integers I.

8. The set of irrational numbers H, and the set of real numbers R.

STATE WHETHER THE GIVEN SET IS FINITE OR INFINITE.

9. The odd natural numbers. OBJ. 7

10. The rational numbers between 5 and 6.

11. The natural numbers whose numerals contain four digits.

12. Find the decimal for 5/6. Is this form terminating, repeating, or non-repeating? OBJ. 9

13. Is 0.010010001... a rational or irrational number? OBJ. 5

14. Let $A = \{2, 4, 6, 8, 10\}$, $B = \{1, 2, 3, 4, 5\}$, $C = \{1, 3, 5, 7, 9\}$, and $D = \{6, 7, 8, 9, 10\}$.

List the following: OBJ. 6

a. $B \cap C$

b. $B \cup B$

c. $C \cup \emptyset$

d. $A \cap \emptyset$

e. $(A \cap C) \cup B$

f. $[(A \cup B) \cap C] \cap [(A \cap C) \cup (B \cap C)]$

15. Let A = {set of even natural numbers less than 10}, OBJ. 3

a. Describe A by a roster.

b. Describe set A by using set builder notation.

16. Is 71 a prime number? OBJ. 8

MATH 110
COURSE OBJECTIVES
UNIT 2

1. Graph on the number line a set of numbers specified by the roster method or the set builder method.

2. Determine the proper order relationships between two given numbers.

3. Graph sets of the form:

   $\{x| \ |x| = a\}$, $\{x| \ |x| < a\}$, $\{x| \ |x| \leq a\}$

   $\{x| \ |x| > a\}$, $\{x| \ |x| \geq a\}$

4. Graph sets of the form:

   $\{x| \ a < x < b\}$, $\{x| \ a \leq x \leq b\}$, $\{x| \ a < x \leq b\}$

   $\{x| \ a \leq x < b\}$

5. Graph any set formed by taking the intersection or the union of any of the above mentioned sets.

6. Given the graph of a set on the number line, specify the set by, (a) the roster method, (b) the set builder method, (c) absolute values, (d) union or intersection of sets.

MATH 110
SELF-TEST
UNIT 2

FILL IN EACH BLANK WITH THE PROPER SIGN FROM AMONG <, =, >.

1. $|-5|$ _____ -4

2. If $a < b$, then $-a$ _____ $-b$

3. $-|6|$ _____ 6

4. If $x < 0$, then $-x$ _____ 0. OBJECTIVE 1

GRAPH THE FOLLOWING SETS:

5. $\{4, 7, 3\ 1/2\} \cap \{3, 49, 4, 7\}$

6. $\{x \mid |x| < -3\}$

7. $\{x \mid |x| > -3\}$

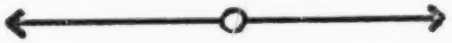
8. $\{x \mid x > 2\} \cap \{x \mid x < -4\}$ OBJECTIVES 3, 4, 5

9. $\{x \mid x < 2\} \cup \{x \mid x > -4\}$

10. $\{x \mid x$ is non-positive$\}$

11. $\{x \mid |x| \leq 2\} \cup \{x \mid |x| > 3\}$

12. Write the set whose graph is given below (use set builder notation). OBJECTIVE 6



$x = 0$

MATH 110
OBJECTIVES AND SELF-TEST
UNIT 3

OBJECTIVES:

1. Simplify expressions involving [+, -, ( ), and [ ]].
2. Given a statement name the property that justifies the statement.

SELF-TEST:

1. Rewrite as a sum: $5 - (-x)$

Simplify:

2. $(-3) - (-5) - 6$
3. $25 + 18 - 43$
4. $6 - (4 - 2)$
5. $(38 - 25) - (13 - 17 - 2)$
6. $-|-2|$

Supply reasons for each of the following statements:

7. $0 \cdot 8 = 0$
8. If $a = b$, then $a + (-x) = b + (-x)$
9. If $2 = x$, then $x = 2$
10. $a(b + c) = (b + c)a$
11. $a + c(b + d) = a + cb + cd$
12. $a \cdot \frac{1}{a} = 1 \quad (a \neq 0$
13. $(a + b) + [-(a + b)] = 0$
14. $(5 \cdot 6)2 = 5 \cdot (6 \cdot 2)$
15. $x + (y + b) = (x + y) + b$

} OBJECTIVE 2

MATH 110
OBJECTIVES
UNIT 4

1. Simplify expressions involving [+, x, ÷, -, (), and []].

2. Write $+\frac{a}{b}$ as $a \cdot \frac{1}{b}$ and as $a \div b$.

3. Evaluate an expression using the conventions on the order of operations.

4. State 2 forms of DPMA.

5. Correctly identify monomial, binomial, trinomial, exponent, factor, term, coefficient, polynomial and degree.

6. Write algebraic expressions in simplest form.

7. Multiply polynomials.

8. Write composite numbers as products of prime numbers.

9. Given the signs of a,b determine the sign of $a \cdot b$, $a + b$, $a - b$, $a \div b$.

MATH 110
SELF-TEST
UNIT 4

EVALUATE:

1. $-3[(2 + (-3)) + 3]$

2. -3^4 OBJECTIVES 1, 3

3. $(-2)[4(5-1)] + 8 \div 2$

WRITE IN SIMPLEST FORM:

4. $x - 3[2 - 3(x + 1)]$ OBJECTIVE 6

5. $(y + 4)(y^2 - 4y + 16)$ OBJECTIVE 7

6. What is the degree of $4 - 7x + 17x^2 + 1308x^4$? OBJECTIVE 5

7. Express as a product of primes: 72 OBJECTIVE 8

8. If $x = -3$, $y = 2$, and $z = 1$, evaluate

   a. $-x^2$

   b. $(z + xy)x^2$ OBJECTIVE 3

   c. $4xy^2z^3 - x^2yz^5$

9. If $x < 0$, then $|x|$ is positive, negative, or zero?

10. If $a \in R$, what does $\frac{a}{0}$ equal?

MATH 110
COURSE OBJECTIVES AND SELF-TEST
UNIT 5

OBJECTIVES:

1. Recognizing the correct usage of the laws of exponents.
2. Simplify expressions using the laws of exponents.
3. Factor binomials, trinomials, and polynomials of 4 terms.
4. Multiply binomials in your head

SELF-TEST:

SIMPLIFY: 1. $\frac{-a^2b^2}{ab}$ 2. $\frac{x^n y^{n+1}}{xy}$ 3. $2x^4y(-3x^3y^4)$ OBJECTIVE 2

FACTOR COMPLETELY OVER THE INTEGERS:

4. $3x^2y + 6xy$
5. $x^{4n} - x^{2n}$
6. $x^2 - 8x + 12$
7. $15 - 2a - a^2$
8. $25 - y^4$
9. $x^2 - 9xy + 20y^2$
10. $2x^2 + 6x - 20$
11. $y^4 + 3y^2 + 2$
12. $2a^2b + 6a^2 - b - 3$
13. $a^3 - 8b^3$
14. $(x + y)^3 + (x - y)^3$
15. $3x^{4n} - 10x^{2n} + 3$

OBJECTIVE 3

16. Which of the following are correct applications of the laws of exponents:

(a) $(x^2 + y^2)^2 = x^4 + y^4$ (c) $(A \cdot B \cdot C)^2 = A^2B^2C^2$

(b) $(x^2)^3 = x^6$ (d) $\left(\frac{A}{B}\right)^2 = \frac{A^2}{B}$

OBJECTIVE 1

MATH 110
OBJECTIVES AND SELF-TEST
UNIT 6

OBJECTIVES:

1. Be able to reduce algebraic fractions to lowest terms.
2. Write the fraction--A/B in three other forms.
3. Be able to multiply fractions and reduce to lowest terms.
4. Be able to divide fractions and reduce to lowest terms.
5. Simplify complex fractions.
6. Be able to add and subtract fractions.
7. Be able to divide a polynomial by another polynomial.

SELF-TEST:

1. Write in standard form: $-(-\frac{-6}{-xy})$ OBJECTIVE 1

2. Write $-\frac{3x}{y}$ in three equivalent forms. OBJECTIVE 2

REDUCE TO LOWEST TERMS:

3. $\frac{a^3b^2c^3}{ab^3c}$ 4. $\frac{x^2 - 16}{4 - x}$ 5. $\frac{8y^3 - 27}{2y - 3}$ 6. $\frac{4y^2 + 12y + 5}{2y + 1}$

OBJECTIVE 1

7. PERFORM THE FOLLOWING DIVISION BY THE LONG DIVISION METHOD. GIVE ANSWER IN THE FORM QUOTIENT PLUS REMAINDER OVER DIVISION.

$(x^4 - 3x^3 + 2x^2 - 1) \div (x - 2)$ OBJECTIVE 7

8. SIMPLIFY: $\frac{x + \frac{x}{y}}{1 + \frac{1}{y}}$ OBJECTIVE 5

WRITE EACH SUM OR DIFFERENCE AS A SINGLE FRACTION IN LOWEST TERMS.

9. $y + \frac{2y}{y^2 - 1} + \frac{3}{y + 1}$

10. $\frac{5x - y}{3x + y} - \frac{6x - 5y}{2x - y}$ OBJECTIVE 6

WRITE EACH AS A SINGLE FRACTION IN LOWEST TERMS.

11. $\frac{x^2 - x - 20}{x^2 + 7x + 12} \cdot \frac{(x + 3)^2}{(x - 5)^2}$ OBJECTIVE 3

12. $\frac{18 - 4y}{3y + 2} \div \frac{6y - 27}{-(6y + 4)}$ OBJECTIVE 4

MATH 110
OBJECTIVES AND SELF-TEST
UNIT 7

OBJECTIVES:

1. Recognize the correct usage of the laws of rational exponents.
2. Simplify expressions using the laws of rational exponents.
3. Determine the principle square root of a number.
4. Determine the numerical values of expressions raised to rational exponents.
5. Translate from standard form to scientific form and vice versa.
6. Perform computations using scientific notation.

SELF-TEST:

Simplify: Leave no answer with a negative or zero exponent.

1. $(m^2n^2)^3\ (-mn^2)^3$
2. $\left(\frac{2x}{y^2}\right)^3\left(\frac{y^2}{3x}\right)$
3. $\frac{\left(x^{n+1}x^{2n-1}\right)^2}{x^{3n}}$
4. $32^{\frac{3}{5}}$
5. $(-32)^{\frac{4}{5}}$
6. $0^{\frac{1}{2}}$
7. $(-64)^{\frac{2}{3}}$
8. $\left(x^{\frac{1}{2}}y^{\frac{1}{3}}\right)^6$
9. $\frac{x^{-1}}{y^{-1}} + \frac{y^{-1}}{x^{-1}}$
10. $\left(\frac{x^{-1}y^3}{2x^0y^{-5}}\right)^{-2}$

OBJ. 2, 4

11. $4^{\frac{1}{2}} + 4^{-\frac{1}{2}}$
12. $(x^3)^{-\frac{1}{3}}$
13. $\left(\frac{x^{\frac{1}{2}}}{y^2}\right)^2\left(\frac{y^4}{x^2}\right)^{\frac{1}{2}}$

Write in scientific notation.

14. 34,000
15. 0.000006
16. -3190

Write in standard form. OBJ. 5

17. 42.1×10^4
18. 21.2×10^{-6}
19. -2.1×10^{-3}

20. Simplify: $\dfrac{0.0054 \times 0.05 \times 300}{0.0015 \times 0.27 \times 80}$ OBJECTIVE 6

21. Find the principal square root of $(-2.1)^2$ OBJECTIVE 3

22. Which of the following are correct applications of the laws of rational exponents:

a. $(-8)^{\frac{1}{3}} = -2$

b. $(-4)^{\frac{1}{2}}(-2)^{\frac{1}{2}} = 8^{\frac{1}{2}}$

c. $(x^2y^2)^2 = (xy)^6$

d. $(x^2y^{-3})^{-1} = x^{-2}y^3$

e. $64^{\frac{-2}{3}} = (64^{-2})^{\frac{1}{3}}$

MATH 110
SELF-TEST
UNIT 8

OBJECTIVES:

1. Evaluate and simplify radicals.
2. Perform arithmetical operations with radicals and simplify.
3. Rationalize the denominators of radical expressions.

SELF-TEST:

TRUE OR FALSE:

1. $\sqrt{49} = +7$ and -7
2. $\sqrt{x^2} = |x|$
3. $\sqrt{x^2 + y^2 + z^2} = x + y + z$

PROBLEMS 1-5, OBJ. 1

4. $(\sqrt{4^2})^2 = 16$
5. $\frac{2}{\sqrt{2}} = \sqrt{2}$

SIMPLIFY. ASSUME THAT ALL VARIABLES DENOTE POSITIVE NUMBERS.

6. $-\sqrt[4]{16}$
7. $\sqrt[3]{-49}$
8. $\sqrt[3]{-27x^4y^3}$
9. $\sqrt[3]{\frac{1}{2}}$
10. $\sqrt[6]{8x^3y^6}$
11. $\frac{a}{\sqrt{ab}}$
12. $\sqrt{75a^3} - a\sqrt{3a}$
13. $\frac{a - b}{\sqrt{a} + \sqrt{b}}$
14. $(\sqrt[3]{4} + \sqrt[3]{2})^2 - (\sqrt[3]{4} - \sqrt[3]{2})^2$
15. $\sqrt{x^4 + 2x^2y^2 + y^4}$

PROBLEMS 6-10, OBJ. 1 PROBLEMS 11 & 13, OBJ. 3 PROBLEMS 12, 14, OBJ. 2

MATH 110
COURSE OBJECTIVES AND SELF-TEST
UNIT 9

OBJECTIVES:

1. Identify conditional and identify equations.
2. Determine solution sets for linear equations and equations involving absolute values.
3. Solve an equation for a specified variable in terms of the remaining variable.
4. Translate verbal problems into an equation and solve.

SELF-TEST:

Classify as conditional equations or identities.

1. $\frac{4x - 6x}{2} + 1 = 1 - x$

2. $\frac{5y}{4} = \frac{2 + 3y}{4} - \frac{1 - y}{2}$

3. $\frac{2}{3}(y - 4) + \frac{2}{5}(y + 3) = y - 1$

(PROBLEMS 1-3, OBJECTIVE 1)

Find the solution set over R.

4. $2[x - (2x + 1)] = 6$

5. $\frac{x}{x + 1} + \frac{4}{5} = 6$

(OBJECTIVE 2)

6. $|2x + 1| = 7$

7. $\frac{x^2 + 2x}{3} - x = \frac{x(x - 1)}{3}$

Solve for the indicated letter.

8. $A = \frac{h}{2}(b + c)$, for c

9. $S = \frac{a}{1 - r}$, for r

10. $2xy_1 - 3y_1 + x^2 = o$, for y.

(PROBLEMS 8-10, OBJECTIVE 3)

Word Problem

11. On freight train travels 6 miles an hour faster than a second freight train. The first freight travels 280 miles in the same time the second freight travels 210 miles. Find the rate of each.

(OBJECTIVE 4)

MATH 110
SELF-TEST
UNIT 10

OBJECTIVES:

1. Solve quadratic equations by:
   a. factoring
   b. completing the square
   c. using the quadratic equation

2. Given the solution set, determine the equation.

3. By evaluating the discriminant, determine if a quadratic equation has 0, 1, or 2 real roots.

4. Translate word problems into a quadratic equation and solve.

SELF-TEST:

Solve for x by the indicated method.

1. $2x^2 = 3x$ (factoring)

2. $x - 1 = \frac{1}{5}x^2$ (completion of the square)

3. $x^2 = bx$

4. $x - 3\sqrt{x} + 2 = 0$

5. $x^4 - 3x^2 - 4 = 0$

6. $3x^2 + xy + y^2 = 2$ (in terms of y)

(Probs. 3-6 any method) (OBJ. 2)

Find a quadratic equation for each of the given solution sets.

7. $\{a, -a\}$

8. $\left\{\frac{1}{2}, \frac{3}{4}\right\}$

9. $\{5 + \sqrt{2}, 5 - \sqrt{2}\}$

(OBJECTIVE 3)

10. Determine the number of real roots of $5x^2 + 2x - 1 = 0$ by using the discriminant. (OBJECTIVE 4)

11. A ball thrown vertically upward reaches a height "h" in feet given by the equation $h = 32t - 8t^2$, where "t" is the time in seconds after the throw. How long will it take the ball to reach a height of 24 feet on its way up? How long after the throw will the ball return to the ground?

MATH 110
OBJECTIVES
UNIT 11

1. Determine the domain and range of a given relation or function.

2. Given "a" determine f (a) for any a.

3. Draw a graph of a function.

4. Determine the zeros of a function.

5. Given a relation, determine if the relation is a function.

MATH 110
SELF-TEST
UNIT 11

Specify the domain and range for each set of ordered pairs and state which of the relations is a function.

1. (1,-2), (2,-4), (3,-6), (4,-8), (5,-10)
2. (a,-1), (a,0), (b,-1), (b,0)

OBJ. 1, 5

3. a. Graph $y = 4x + 2$ over R X R.
   b. Graph $y = 1 - x^2$ over R X R.

OBJ. 3

4. Find the domain and range of:
   a. $f(x) = 1/4\ x + 3$
   b. $y = x^3$
   c. $h(x) = \sqrt{x^2}$
   d. $g(x) = \sqrt{x + 1}$

OBJ. 1

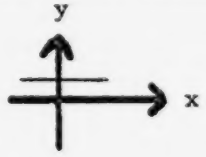
5. If $f = (x, f(x)) \mid f(x) = 2x^2 - 3x + 1$, find:
   a. $f(3)$ b. $f(-2) - f(-1)$ c. $f(x + h)$

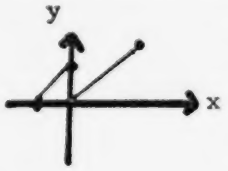
OBJ. 2

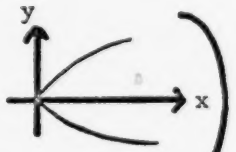
6. Find the zeros of $y = x^2 - 8x + 15$.

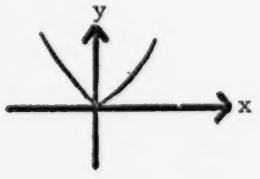
OBJ. 4

7. Which of the following represent functions?

a.


b.


c.


d.


OBJ. 5

MATH 110
OBJECTIVES
UNIT 12

1. Determine the coordinates of the point where a line crosses the x and y axis.

2. Determine the slope of the line connecting two points.

3. Determine the equation of a line, given:

   a. 2 points

   b. one point and the slope

   c. a point on the line and another line to which the line is parallel

   d. a point and the y-intercept

4. Given the equation of a line, determine:

   a. slope

   b. y-intercept

   c. graph

5. Determine if 2 lines are parallel or perpendicular.

6. Determine the distance between 2 points.

MATH 110
SELF-TEST
UNIT 12

1. Find the x and y intercept of $2x + y = -1$. OBJ. 1

2. a. Find the distance between the points (3, -5) and (6,8). OBJ. 6

   b. Find the slope of the line through the given points. OBJ. 2

   c. Write the equation of the line passing through the given points. Write your equation in the form $AX + BY + C = 0$. OBJ. 3a

3. Write $2x + 3y = 6$ in slope-intercept form and specify the slope and the y intercept and graph. OBJ. 4

4. Write an equation in the form $AX + BY + C$ of the line through (-1,1) parallel to the graph of $2x = 5 - 3y$. Graph both equations. OBJ. 3c

5. Are the lines represented by $2y - 1 = -6x$ and $-x = -3y + 6$ perpendicular? OBJ. 5

TRUE-FALSE

6. The lines $x = 5$ and $y = x - 5$ have the same x-intercept. OBJ. 1

7. A vertical line has slope of zero. OBJ. 4a

8. The line $y = -x$ is parallel to the line $y = x$. OBJ. 5

9. The graph of a constant function is always parallel to an axis. OBJ. 5

10. The point (0,3) lies on the line determined by (-1,5) and (4,-5).

MATH 110
OBJECTIVES
UNIT 13

1. Determine if a parabola is fill or spill.

2. Determine the x and y intercepts of a parabola.

3. Find the zeros of a quadratic function.

4. Find the maximum or minimum value of a quadratic function.

5. Find the coordinates of the vertex of a parabola.

6. Graph a quadratic function.

7. Determine the range and domain of a quadratic function.

MATH 110
SELF-TEST
UNIT 13

1. Identify each parabola as a fill or spill type.

   a. $y = x^2 - 5x + 4$ b. $f(x) = -4x + x^2$

   c. $f(x) = -x^2 + 7x - 6$ d. $y = 2x^2 + 3x - 9$

   e. $y = 3x^2 + 6$

2. Find the x and y intercepts of the parabolas in Problem 1.

3. Find the zeros of each function in Problem 1.

4. Find the maximum or minimum value of each function in Problem 1.

5. Find the coordinates of the vertex of each parabola in Problem 1.

6. Graph each parabola in Problem 1.

7. Determine the range and domain of parts a and c in Problem 1.

MATH 110
OBJECTIVES
UNIT 14

1. Recognize the type of conic section from its equation.
2. Graph conic sections. Use x and y intercepts to assist in graphing.
3. Rewrite the equation of a conic as two separate functions.
4. Determine the domain of the functions described in Objective 4.

SELF-TEST
UNIT 14

I. Given the following equations:

   a. Name the type of conic section.

   b. Write each equation as two separate functions.

   c. Determine the domain of each function in Part b.

   d. Graph.

      1. $x^2 + y^2 = 4$
      2. $9x^2 + y^2 = 36$
      3. $x^2 + 4y^2 = 16$
      4. $x^2 - y^2 = 1$
      5. $y^2 - x^2 = 9$
      6. $2x^2 + 3y^2 = 24$

MATH 110
OBJECTIVES
UNIT 15

1. Translate a verbal problem or variation into the form

$$y = \frac{k}{p(x)} \quad \text{or} \quad y = k \cdot f(x).$$

2. In objective 1, given an ordered pair (x, y) determine K. Given any value of x or y determine the corresponding value of y or x respectively.

3. In objective 1, determine the effect on one variable if the other variable is increased or decreased in a specific manner.

MATH 110
SELF-TEST
UNIT 15

Write an equation expressing the relationship between the variables, using k as the constant of variation.

1. The distance (d) traveled by a car moving at a constant rate varies directly as the time (t).

2. The current (I) in an electrical circuit with constant voltage varies inversely as the resistance (R) of the circuit.

3. The volume (V) of a rectangular box of fixed depth varies jointly as its length (l) and width (w).

Find the constant of variation for each of the following stated conditions.

4. If y varies directly as x and $y = 6$ when $x = 2$.

5. If U varies inversely as the square of V and $U = 2$ when $V = 10$.

6. If Z varies jointly as x and y and $z = 8$ when $x = 2$ and $y = 2$.

SOLVE

7. The distance a particle falls in a certain medium is directly proportional to the square of the length of time it falls. If the particle falls 16 feet in 2 seconds, how far will it fall in 10 seconds?

8. If y varies jointly as x and z and x is doubled and z is doubled, what can you say about the corresponding value of y?

MATH 110
OBJECTIVES--INVERSE FUNCTIONS
UNIT 16

1. Given a relation, determine the inverse relation and be able to determine the domain and range of the inverse relation.

2. Given the graph of a relation, determine the graph of the inverse relation.

3. Determine if the inverse of a function is also a function.

4. Given a particular domain or range value of a function, determine the corresponding range or domain values of the inverse function.

5. Given f determine $f(f^{-1}(a))$, $f^{-1}(f(a))$, $f(f(a))$ for any specified a.

MATH 110
SELF-TEST
UNIT 16

In each problem, each equation defines a relation.

a. Write the equation defining the inverse relation.

b. Sketch graph of each relation and the inverse relation.

c. State whether the inverse relation is a function.

1. $2x + 4y = 7$

2. $y = x^2 - 4x$

3. $y = |x|$

4. The equation $y = \sqrt{4 - x^2}$ defines a function f with domain $\{x| \ |x| \leq 2\}$.

   a. What is the range of F?

   b. What is the equation defining f^{-1} and state its domain.

   c. Is f^{-1} a function?

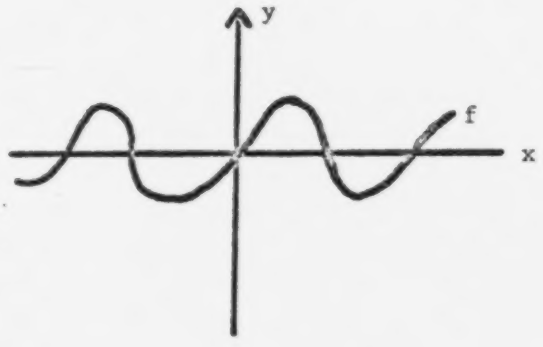
5. If $f(x) = 4x - 3$, find $f^{-1}(x)$ and find:

   a. $f^{-1}(4)$ b. $f[f^{-1}(x)]$ c. $f^{-1}[f(x)]$

6. The function is given by $\{(1, -3) \ (2, 3) \ (-1, 0) \ (4, 6)\}$, find

   a. $f(1)$ b. $f^{-1}(3)$ c. $f[f^{-1}(0)]$

7. Find the inverse graphically. Is the inverse a function?



MATH 110
OBJECTIVES--EXPONENTIAL FUNCTIONS
UNIT 17

1. Graph exponential functions.

2. Graph the inverse of a given exponential function.

3. Determine the domain and range of an inverse function.

4. Determine if a function strictly increasing or strictly decreasing.

MATH 110
SELF-TEST
UNIT 17

Graph the following

1. a. $y = 4^x$

   b. $y = 3^{-x}$

   c. $y = (\frac{1}{4})^x$

   d. $y = 3^{2x}$

2. Graph the inverse of each function in no. 1.

3. a. Determine the domain and range of each function in no. 1.

   b. Determine the domain and range of each function in no. 2.

4. a. Determine whether each function in no. 1 is strictly increasing or strictly decreasing.

   b. Determine whether each function in no. 2 is strictly increasing or strictly decreasing.

MATH 110
OBJECTIVES--PROPERTIES OF LOGARITHMS
Unit 18

1. Given an equation of the form $y = a^x$, rewrite in the form $x = \log_a y$ and vice versa.

2. Memorize the laws of logarithms.

3. Use the laws of logarithms to expand products into sums, quotients into differences.

4. Given the logs of specific numbers, determine the logs of other numbers by rewriting the other numbers using laws of logarithms.

5. Solve equations involving logarithms.

6. Determine the domain and range of the logarithm function.

MATH 110
SELF-TEST
UNIT 18

Express the following in logarithmic notation:

1. $4^2 = 16$ 2. $(\frac{1}{2})^2 = \frac{1}{4}$ 3. $10^2 = 100$ 4. $8^{-\frac{1}{3}} = \frac{1}{2}$

Express the following in exponential notation:

5. $\log_7 49 = 2$ 6. $\log_3 \sqrt{3} = \frac{1}{2}$ 7. $\log_2 2 = 1$ 8. $\log_{10} 0.01 = -2$

Solve for the variable:

9. $\log_3 9 = y$ 10. $\log_4 x = 3$ 11. $\log_2 (\frac{1}{8}) = y$

12. $\log_{10} x = -3$ 13. $\log_b 10 = \frac{1}{2}$ 14. $10^{\log_{10} 5} = x$

If $\log_{10} 4 = .6012$, $\log_{10} 7 = .8451$, find without tables:

15. $\log_{10} 28$ 16. $\log_{10} (\frac{7}{4})$ 17. $\log_{10} 4^7$

Express as the sum or difference of simplier logarithmic quantities:

18. $\log_b (\frac{xy}{z})$ 19. $\log_{10} \sqrt{x(x-y)}$ 20. $\log_{10} 2\pi \sqrt{\frac{1}{q}}$

Express as a single logarithm:

21. $\log_b x - \log_b y$ 22. $3 \log_b x + \log_b y - 2 \log_b z$

23. Describe the domain and range of $y = \log_{.5} x$

MATH 110
OBJECTIVES--COMPUTATION WITH LOGARITHM 1
Unit 19

1. Given numbers, write it in scientific form. Determine the characteristics and mantissa of its logarithm. (using tables)

2. Given the logarithm of a number, determine the number. (using tables)

3. Use interpolation to determine a more accurate estimate of the logarithm of a number or the antilog of a logarithm.

MATH 110
SELF-TEST
UNIT 19

Find each logarithm:

1. $\log_{10} 6.73$

2. $\log_{10} 83.7$

3. $\log_{10} 317$

4. $\log_{10} 0.813$

5. $\log_{10} 0.08$

6. $\log_{10} (2.48 \times 10^2)$

Find N in each problem:

7. $\log_{10} N = 0.6128$

8. $\log_{10} N = 1.5647$

9. $\log_{10} N = 8.8075 - 10$

10. $\log_{10} N = 1.2041$

11. $\log_{10} N = 3.7388$

12. $\log_{10} N = (6.8561 - 10)$

Using linear interpolation, solve for N:

13. $N = \log_{10} 4.213$

14. $N = \log_{10} 0.008351$

15. $\log_{10} N = 0.5085$

16. $\log_{10} N - 2.8748 - 3$

MATH 110
OBJECTIVES--COMPUTATION WITH LOGARITHM, Part 2
UNIT 20

1. Compute products, quotients, exponential expressinns using logarithms.

MATH 110
SELF-TEST
UNIT 20

Compute by means of logarithms:

1. $(2.32)(1.73)$

2. $\dfrac{3.15}{1.37}$

3. $(2.3)^5$

4. $\sqrt[3]{8.12}$

5. $(0.01258)^5$

6. $\sqrt[5]{0.0471}$

7. $\dfrac{(0.421)^2(84.3)}{\sqrt{21.7}}$

8. $\dfrac{(6.49)^2\ \sqrt[3]{8.21}}{17.9}$

MATH 110
OBJECTIVES
UNIT 21

1. Solve an exponential equation.

2. Solve a logarithmic equation.

3. Solve a radical equation.

4. Solve linear inequalities.

5. Solve quadratic inequalities.

6. Solve inequalities and equations involving absolute value.

7. Graph equations involving absolute value.

MATH 110
OBJECTIVES
UNIT 22

1. Solve a linear system involving two equations, two unknowns, and three equations, three unknowns both algebraically and by Cramer's Method.

2. Evaluate second and third order determinates.

3. Determine if a system is consistant, inconsistent, or dependent.

45- 46

MATH 110
SELF-TEST
UNIT 22

Solve algebraically and by Cramer's Rule.

1. $\begin{cases} x + 5y = 11 \\ x + 3y = 8 \end{cases}$

2. $\begin{cases} x + 3y - z = 3 \\ 2x - y + 3z = 1 \\ 3x + 2y + z = 5 \end{cases}$

3. Evaluate $\begin{vmatrix} 3 & -2 \\ 1 & -5 \end{vmatrix}$

4. Evaluate $\begin{vmatrix} 2 & 1 & 3 \\ 0 & 4 & -1 \\ 2 & 0 & 3 \end{vmatrix}$

State whether the following equations in each system are dependent, inconsistent, or consistant.

5a. $\begin{cases} 2x - 3y = 4 \\ x + 2y = 7 \end{cases}$

b. $\begin{cases} 2x - 3y = 4 \\ 6x - 9y = 12 \end{cases}$

c. $\begin{cases} 2x - 3y = 4 \\ 6x - 9y = 4 \end{cases}$

d. $\begin{cases} x - y = 6 \\ x + y = 6 \end{cases}$

MATH 110
OBJECTIVES
UNIT 23

1. Solve a system such as one linear and one conic and two conics.

2. Graph linear and quadratic inequalities.

MATH 110
SELF-TEST
UNIT 23

Solve each of the following systems

1. $\begin{cases} x^2 + y = 3 \\ 5x + y = 7 \end{cases}$

2. $\begin{cases} x^2 + 3xy + x = -12 \\ 2x - y = 7 \end{cases}$

3. $\begin{cases} 2x^2 + 5y^2 - 53 = 0 \\ 4x^2 + 3y^2 - 43 = 0 \end{cases}$

4. Graph: $y \geq x^2 + 3$

5. Graph: $\{(x, y) | x^2 + y^2 \leq 25\} \cap \{(x, y) | x^2 + y^2 \geq 16\}$

6. Graph: $\{(x, y) | y \leq 1 - x^2\} \cap \{(x, y) | y \geq -1\}$

7. Graph: $\{(x, y) | y \leq 4\} \cap \{(x, y) | x \geq 1\}$